



PATENT APPLICATION

IN THE U.S. PATENT AND TRADEMARK OFFICE

Applicants: Isao SAWAMOTO et al

For: ELECTROLYTIC GAS GENERATION METHOD AND  
ELECTROLYTIC GAS GENERATION DEVICE

Serial No.: 10/815 587

Group: 1795

Confirmation No.: 9472

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Commissioner for Patents  
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**DECLARATION UNDER 37 CFR 1.132**

I, the undersigned, hereby declare as follows:

I am one of the inventors of the invention described and claimed in application Serial No. 10/815 587, filed on April 1, 2004.

I hereby incorporate by reference herein the contents of the Examples and Comparative Examples contained in application Serial No. 10/815 587.

I have performed additional test to illustrate the criticality of mixing pure water with carbon dioxide and using the mixture as an anolyte in an electrolytic gas generation device for generating ozone gas.

**Experiment Example 1**

A porous anodic substance and a cathodic substance were disposed at opposite sides of an ion-exchange film, and a super-high purity water containing 500 ppb of residual hydrogen peroxide was used as pure water, and the pure water was supplied into the anode chamber by way of a mechanism for contacting with carbon dioxide at a flow rate of 1.4 L/hr through a PTFE membrane installed in the guide tube thereof. Electrolysis was started by supplying 150 A from the power

source, and the quantity of ozone gas generated from the anode was 8.4 g/hr. The electrolysis was continued for one month in the same condition, and there was no change in the quantity of ozone gas.

#### Comparative Example 1

The electrolysis was conducted in the same condition as in Experiment Example 1, except that the pure water was supplied into the anode chamber by way of a mechanism for supplying hydrochloric acid at a flow rate of 4 cc/min, instead of the mechanism for contacting with carbon dioxide.

The quantity of ozone gas generated from the anode was 2.8 g/hr at the beginning, but decreased gradually, falling to 2.0 g/hr in 2 weeks, and as compared with Experiment Example 1, the generated quantity of ozone gas decreased to 1/4. Similarly to Experiment Example 1, the electrolysis was continued for one month in the same condition, but the quantity of ozone gas was not increased and remained at 2.0 g/hr.

#### Experiment Example 2

A porous anodic substance and a cathodic substance were disposed at opposite sides of ion-exchange film, and a pure water containing 1 ppb of organic matter was used, and the pure water was supplied into the anode chamber by way of a mechanism for contacting with carbon dioxide at a flow rate of 1.4 L/hr through a PTFE membrane installed in the guide tube thereof. Electrolysis was started by supplying 150 A from the power source, and the quantity of ozone gas generated from the anode was 8.4 g/hr. The electrolysis was continued for one month in the same condition, and there was no change in the quantity of ozone gas.

#### Comparative Example 2

The electrolysis was conducted in the same condition as in Experiment Example 2, except that the pure water was supplied into the anode chamber by way of a mechanism for supplying hydrochloric acid at a flow rate of 4 cc/min, instead of the mechanism for contacting with carbon dioxide.

The quantity of ozone gas generated from the anode was 4.5 g/hr at the beginning, but decreased gradually, falling to 2.3 g/hr in 2 weeks, and as compared with Experiment Example 1, the generated quantity of ozone gas decreased to 1/4. Similarly to Experiment Example 1, the electrolysis was continued for one month in the same condition, but the quantity of ozone gas was not increased and remained at 2.0 g/hr.

#### DISCUSSION OF RESULTS

As can be seen from the above test data, the mixing of carbon dioxide with pure water provides an anolyte which enables ozone to be generated at a high concentration consistently and continuously for an extended period of time as compared to conventional processes using a mixture of pure water and hydrochloric acid.

I hereby declare that all statements made herein of my own knowledge are true, and that all statements made on information and belief are believed to be true; and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Dated: \_\_\_\_\_